AVR 32-bit GNU Toolchain: Release 3.2.3.261

The AVR 32-bit GNU Toolchain supports all AVR 32-bit devices. The AVR 32-bit Toolchain is based on the free and open-source GCC compiler. The toolchain includes compiler, assembler, linker and binutils (GCC and Binutils), source code libraries (Newlib), and debugger (GDB).

8/32-bit AVR®
Microcontrollers

Release 3.2.3.261

Installation Instructions

System Requirements

AVR 32-bits GNU Toolchain is supported under the following configurations

Hardware requirements

- Minimum processor Pentium 4, 1GHz
- Minimum 512 MB RAM
- Minimum 500 MB free disk space

AVR 32-bit GNU Toolchain has not been tested on computers with less resources, but may run satisfactorily depending on the number and size of projects and the user's patience.

Software requirements

- Windows 2000, Windows XP, Windows Vista or Windows 7 (x86 or x86-64).
- Fedora 13 or 12 (x86 or x86-64), RedHat Enterprise Linux 4 or 5, Ubuntu Linux 10.04 or 8.04 (x86 or x86-64), or SUSE Linux 11.2 or 11.1 (x86 or x86-64). AVR 32bits GNU Toolchain may very well work on other distributions. However those would be untested and unsupported.

AVR 32-bits GNU Toolchain is not supported on Windows 98, NT or ME.

Downloading and Installing

The package comes in several forms.

- As part of a standalone installer (avr-toolchain-installer)
- As part of AVR Studio 5

It can be downloaded from Atmel's website at *http://www.atmel.com*

Installing on Windows

When installing as a part of AVR Studio 5 you do not have to do anything. See Release Notes for AVR Studio 5 for more details.

The AVR Toolchain Installer can be downloaded from the website as noted above. After downloading, double-click the installer executable file to install. If you wish to specify the location where the AVR Studio 5 software is installed, choose "Custom Installation".

Installing on Linux

When installing as a part of AVR Studio 5 you do not have to do anything. See Release Notes for AVR Studio 5 for more details.

On Linux AVR 32-bits GNU Toolchain is also available as a TAR.GZ archive which can be extracted using the 'tar' utility. Simply extract to the location where you want the application to run from.

Note that if you will develop Linux applications for the AT32AP7000 you must also install the AVR32 Buildroot.

Upgrading from previous versions

If it is installed via AVR Studio 5 it will be upgrade trough the AVR Studio 5 upgrade. See AVR Studio 5 release notes for details.

If you used the standalone installer on MS-Windows, you might do a clean upgrade by first un-installing the old version or just upgrade using the latest installer.

On Linux, if you have it unpacked to a local folder, you just delete the old folder and unpack the latest version in a new folder.

Manifest

1. AVR GNU Binutils 2.20.1
   - Binary utilities for AVR 32-bit target (including assembler, linker, etc.).
2. AVR 32-bit GNU Compiler Collection (avr32-gcc) 4.4.3
   - C language and C++ language compiler for AVR 32-bit target.
3. Newlib (for AVR 32-bit) 1.16.0
   - C Standard Library for AVR 32-bit
4. AVR 32-bit GNU Debugger (avr32-gdb) 6.7.1
   - GDB is a command-line debugger.

Layout

Listed below are some directories you might want to know about.

`<install_dir>` = The directory where you installed AVR 32-bits GNU Toolchain.

- <install_dir>\bin
  - The AVR software development programs. This directory should be in your `PATH` environment variable. This includes:
    - GNU Binutils
    - GCC
    - GNU Debugger (GDB)
- <install_dir>\avr32\lib
  - avr-newlib libraries, startup files, linker scripts,and stuff.
- <install_dir>\avr32\include
  - avr-newlib header files. This is where, for example, #include <string.h> comes from.
- <install_dir>\avr32\include\avr32
  - avr-newlib header files specific to the AVR microprocessor. This is where, for example, #include <avr/io.h> comes from.
- <install_dir>\lib
  - GCC libraries, other libraries,headers and stuff.
- <install_dir>\libexec
  - GCC program components
- <install_dir>\doc
  - Various documentation.
- <install_dir>\source
  - Documentation on where to find the source code for the various projects and source code patches that were used to build the tools.

Toolset Background

AVR 32-bit GNU Toolchain is a collection of executable software development tools for the Atmel AVR 32-bit processor.

These software development tools include:

- Compilers
- Assembler
- Linker
- Librarian
- File converter
- Other file utilities
- C Library

Compiler

The compiler is the GNU Compiler Collection, or GCC. This compiler is incredibly flexible and can be hosted on many platforms, it can target many different different processors/operating systems (back-ends), and can be configured for multiple different languages (front-ends).

The GCC included is targeted for the AVR 32-bit processor, and is configured to compile C, or C++.

Because this GCC is targeted for the AVR 32-bit, the main executable that is created is prefixed with the target name: `avr32-gcc`. It is also referred to as AVR 32-bit GCC.

`avr32-gcc` is just a "driver" program only. The compiler itself is called `cc1.exe` for C, or `cc1plus.exe` for C++. Also, the preprocessor `cpp.exe` will usually automatically be prepended with the target name: `avr32-cpp.exe`. The actual set of component programs called is usually derived from the suffix of each source code file being processed.

GCC compiles a high-level computer language into assembly, and that is all. It cannot work alone. GCC is coupled with another project, GNU Binutils, which provides the assembler, linker, librarian and more. Since GCC is just a "driver" program, it can automatically call the assembler and linker directly to build the final program.

Assembler, Linker, Librarian and More

GNU Binutils is a collection of binary utilities. This also includes the assembler, as. Sometimes you will see it referenced as GNU as or gas. Binutils includes the linker, ld; the librarian or archiver, ar. There are many other programs included that provide various functionality.

Binutils is configured for the AVR 32-bit target and each of the programs is prefixed with the target name. So you have programs such as:

- **avr32-as**: The Assembler.
- **avr32-ld**: The Linker.
- **avr32-ar**: Create, modify, and extract from archives (libraries).
- **avr32-ranlib**: Generate index to archive (library) contents.
- **avr32-objcopy**: Copy and translate object files.
- **avr32-objdump**: Display information from object files including disassembly.
- **avr32-size**: List section sizes and total size.
- **avr32-nm**: List symbols from object files.
- **avr32-strings**: List printable strings from files.

- **avr32-strip**: Discard symbols.
- **avr32-readelf**: Display the contents of ELF format files.
- **avr32-addr2line**: Convert addresses to file and line.
- **avr32-c++filt**: Filter to demangle encoded C++ symbols.

See the binutils user manual for more information on what each program can do.

C Library

Newlib is the Standard C Library for AVR 32-bit GCC. Newlib is a C library intended for use on embedded systems. It is a conglomeration of several library parts. The library is ported to support the AVR 32-bit processor.

Debugging

The GNU Debugger (`GDB`) is the main package that can be used for general debugging. `GDB` is a command-line program only. The main executables are prefixed with the target name: `avr32-gdb`.

GDB needs a proxy to connect to the target. The package AVR Utils from Atmel contains the utility called 'avr32gdbproxy' which acts a proxy connection between GDB and the target via an Atmel emulator.

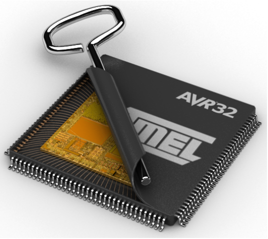
Atmel also offers a free package called `AVR Studio 5` which acts as a GUI to GDB.

New and Noteworthy

This chapter lists new and noteworthy items for the AVR 32-bit GNU Toolchain release.

AVR 32-bit GNU Toolchain

Supported devices



AVR 32-bit GNU Toolchain supports the following devices:

Note:- Devices which are supported in this release are marked with *

```
uc3a0128      uc3a0256       uc3a0512        uc3a0512es      uc3a1128
uc3a1512      uc3a1512es     uc3a3revd       uc3a364         uc3a364s
uc3a3128s     uc3a3256       uc3a3256s       uc3a464         uc3a464s
uc3a4128s     uc3a4256       uc3a4256s       uc3b064         uc3b0128
uc3b0256es    uc3b0512       uc3b0512revc    uc3b164         uc3b1128
uc3b1256es    uc3b1512       uc3b1512revc    uc64d3          uc128d3
uc128d4       uc3c0512crevc  uc3c1512crevc   uc3c2512crevc   uc3l0256
uc3l064       uc3l032        uc3l016         uc3l064revb     uc3c064c
uc3c0256c     uc3c0512c      uc3c164c        uc3c1128c       uc3c1256c
uc3c264c      uc3c2128c      uc3c2256c       uc3c2512c
```

New Features

No new features are added in Release 3.2.3

Component Upgrades

None of the components are upgraded in Release 3.2.3

Notable bugs fixed

- **Issue #9675:**

Misplaced #endif was present in __avr32_f64_cmp_ge/__avr32_f64_cmp_lt function in lib1funcs.S. Because of this, a code fragment of this function was being compiled for other functions as well (inserting garbage). This is now resolved.

- **Issue #7435:**

This bug fix addresses two issues:1)Unsupported architectures listed by `avr32-gcc --target-help'. avr32-gcc target help is now edited to clearly list the architectures supported. 2)When -mpart and -march are passed together, -march overrides -mpart and in some cases, forces an incompatible architecture for a part.With this fix, Conflicting architectures will result in an error instead of getting silently compiled with default architecture.

Known issues

- **Issue #4400:**

'.debug_line' section in the ELF file isn't updated when relaxing. This results in that correct relocation info is not added to the '.debug-line' section that are generated and that there is a mismatch between the code and the debug-line after the linker has done relaxation. Debugging the ELF file will give wrong source line as a result.

Contact Information

For support on AVR 32-bit GNU Toolchain please contact avr@atmel.com.

Users of AVR 32-bit GNU Toolchain are also welcome to discuss on the AVRFreaks website forum for AVR32 Software Tools.

Disclaimer and Credits

AVR 32-bit GNU Toolchain is distributed free of charge for the purpose of developing applications for Atmel AVR processors. Use for other purposes are not permitted; see the software license agreement for details. AVR 32-bit GNU Toolchain comes without any warranty.